CLAIMS

1.   A   base   band   signal   generating   device
comprising:

5   base band signal generating means for converting
data consisting of bit strings, in which at least a
part of the bit strings is distinguished as a
protection object portion, into a base band signal
representing a sequence of symbols of four values; and

10   communication quality judging means for judging
whether   a   communication   quality   of   an   external
transmission path for transmitting the base band
signal has reached a predetermined standard,

          wherein the base band signal generating means
15 operates, in a state in which it is judged that the
communication quality of the transmission path has not
reached the standard, to convert the data into the
base band signal such that at least a part of the
symbols belonging to the sequence of the symbols
20 includes a bit belonging to the protection object
portion and a predetermined redundant bit, and
operates, in a state in which it is judged that the
communication quality of the transmission path has
reached the standard, to convert the data into the
25 base band signal such that at least a part of the
symbols belonging to the sequence of the symbols
includes a bit belonging to the protection object
portion and additional data converted into the base
band signal together with the data, and

30   wherein a value of the redundant bit is set to a

value that makes an instantaneous value of a point representing the symbol including the redundant bit in the base band signal always converge to a maximum value or a minimum value among four values to which

5   the instantaneous value can converge.

      2.   A base band signal generating device comprising:

      base band signal generating means for converting

10   data consisting of bit strings, in which at least a part of the bit strings is distinguished as a protection object portion, into a base band signal representing a sequence of symbols of multiple values; and

15   communication quality judging means for judging whether a communication quality of an external transmission path for transmitting the base band signal has reached a predetermined standard,

      wherein the base band signal generating means

20   operates, in a state in which it is judged that the communication quality of the transmission path has not reached the standard, to convert the data into the base band signal such that at least a part of the symbols belonging to the sequence of the symbols

25   includes a bit belonging to the protection object portion and a predetermined redundant bit, and operates, in a state in which it is judged that the communication quality of the transmission path has reached the standard, to convert the data into the

30   base band signal such that at least a part of the

symbols belonging to the sequence of the symbols includes a bit belonging to the protection object portion and additional data converted into the base band signal together with the data, and

5   wherein a value of the redundant bit is set to a value that makes a minimum value of a difference between instantaneous values of two points representing two symbols including the redundant bit and having values different from each other in the

10   base band signal larger than a minimum value of a difference between instantaneous values of two points representing two symbols not including the redundant bit and different from each other.

15   3.   A base band signal generating device comprising:

base band signal generating means for converting data consisting of bit strings, in which at least a part of the bit strings is distinguished as a

20   protection object portion, into a base band signal representing a sequence of symbols of multiple values; and

communication quality judging means for judging whether a communication quality of an external

25   transmission path for transmitting the base band signal,

wherein at least a part of the symbols belonging to the sequence of symbols includes a bit belonging to the protection object portion and a predetermined

30   redundant bit or additional data converted into the

base band signal together with the data,

wherein the base band signal generating means operates to convert the data into the base band signal such that a larger number of symbols include the

5 additional data as a communication quality of the transmission path is higher, and

wherein a value of the redundant bit is set to a value that makes a minimum value of a difference between instantaneous values of two points

10 representing two symbols including the redundant bit and having values different from each other in the base band signal larger than a minimum value of a difference between instantaneous values of two points representing two symbols not including the redundant

15 bit and different from each other.

4.   The base band signal generating device according to claim 1, 2, or 3, wherein the data is constituted by a bit associated with a component that

20 an object represented by the data can include and the bit takes a value identical with the value of the redundant bit when the component associated with the bit is not present in the object.

25   5.   The base band signal generating device according to any one of claims 1 to 4, wherein the base band signal generating means operates to convert the data into the base band signal such that the sequence of the symbols represented by the base band

30 signal includes a portion in which symbols including

the redundant bit or the additional data and symbols not including the redundant bit and the additional data are alternately arranged.

5   6.   The base band signal generating device according to any one of claims 1 to 5, wherein the data includes a part of a bit string obtained by encoding voice and the additional data includes another part of the bit string.

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7.   The base band signal generating device according to any one of claims 1 to 5, wherein the data includes a portion in which significance determined on the basis of a predetermined standard is
15   the highest of the bit string and the additional data includes a portion in which the significance is the lowest of the bit string.

8.   The base band signal generating device
20   according to any one of claims 1 to 7, wherein the communication quality judging means includes:
      means for measuring intensity of a signal transmitted on the transmission path; and
      means for judging a communication quality of the
25   transmission path on the basis of the intensity of the signal measured.

9.   The base band signal generating device according to any one of claims 1 to 8, wherein at
30   least a part of the data includes data for error

detection of the protection object portion and the base band signal generating means operates, regardless of a judgment result of the communication quality of the transmission path, to convert the data into the base band signal such that at least a part of symbols belonging to the sequence of the symbols includes a bit constituting the data for error detection and the redundant bit.

10. The base band signal generating device according to any one of claims 1 to 9, further comprising modulating means for generating a modulated wave using the base band signal generated by the base and signal generating means and sending the modulated wave to the transmission path.

11. A base band signal generating method, the method comprising the steps of:

generating a base band signal by converting data consisting of bit strings, in which at least a part of the bit strings is distinguished as a protection object portion, into the base band signal representing a sequence of symbols of four values; and

judging whether a communication quality of an external transmission path for transmitting the base band signal has reached a predetermined standard, characterized in that

in the base band signal generating step, processing is performed for, in a state in which it is judged that the communication quality of the

transmission path has not reached the standard, converting the data into the base band signal such that at least a part of the symbols belonging to the sequence of the symbols includes a bit belonging to

5   the protection object portion and a predetermined redundant bit and, in a state in which it is judged that the communication quality of the transmission path has reached the standard, converting the data into the base band signal such that at least a part of

10   the symbols belonging to the sequence of the symbols includes a bit belonging to the protection object portion and additional data converted into the base band signal together with the data, and

a value of the redundant bit is set to a value

15   that makes an instantaneous value of a point representing the symbol including the redundant bit in the base band signal always converge to a maximum value or a minimum value among four values to which the instantaneous value can converge.

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12.   A base band signal generating method, the method comprising the steps of:

generating a base band signal by converting data consisting of bit strings, in which at least a part of

25   the bit strings is distinguished as a protection object portion, into the base band signal representing a sequence of symbols of multiple values; and

judging whether a communication quality of an external transmission path for transmitting the base

30   band signal has reached a predetermined standard,

in the base band signal generating step, processing is performed for, in a state in which it is judged that the communication quality of the transmission path has not reached the standard,

5 converting the data into the base band signal such that at least a part of the symbols belonging to the sequence of the symbols includes a bit belonging to the protection object portion and a predetermined redundant bit and, in a state in which it is judged

10 that the communication quality of the transmission path has reached the standard, converting the data into the base band signal such that at least a part of the symbols belonging to the sequence of the symbols includes a bit belonging to the protection object

15 portion and additional data converted into the base band signal together with the data, and

a value of the redundant bit is set to a value that makes a minimum value of a difference between instantaneous values of two points representing two

20 symbols including the redundant bit and having values different from each other in the base band signal larger than a minimum value of a difference between instantaneous values of two points representing two symbols not including the redundant bit and different

25 from each other.

13. A base band signal generating method, the method comprising the steps of:

generating a base band signal by converting data

30 consisting of bit strings, in which at least a part of

the bit strings is distinguished as a protection object portion, into the base band signal representing a sequence of symbols of multiple values; and

a communication quality judging step of judging
5 a communication quality of an external transmission path for transmitting the base band signal,

wherein at least a part of the symbols belonging to the sequence of symbols includes a bit belonging to the protection object portion and a predetermined
10 redundant bit or additional data converted into the base band signal together with the data,

in the base band signal generating step, processing is performed for converting the data into the base band signal such that a larger number of
15 symbols include the additional data as a communication quality of the transmission path is higher, and

a value of the redundant bit is set to a value that makes a minimum value of a difference between instantaneous values of two points representing two
20 symbols including the redundant bit and having values different from each other in the base band signal larger than a minimum value of a difference between instantaneous values of two points representing two symbols not including the redundant bit and different
25 from each other.

14. A program for causing a computer to execute the steps of:

generating a base band signal by converting data
30 consisting of bit strings, in which at least a part of

the bit strings is distinguished as a protection object portion, into the base band signal representing a sequence of symbols of four values; and

judging whether a communication quality of an external transmission path for transmitting the base band signal has reached a predetermined standard,

in the base band signal generating step, processing is performed for, in a state in which it is judged that the communication quality of the transmission path has not reached the standard, converting the data into the base band signal such that at least a part of the symbols belonging to the sequence of the symbols includes a bit belonging to the protection object portion and a predetermined redundant bit and, in a state in which it is judged that the communication quality of the transmission path has reached the standard, converting the data into the base band signal such that at least a part of the symbols belonging to the sequence of the symbols includes a bit belonging to the protection object portion and additional data converted into the base band signal together with the data, and

a value of the redundant bit is set to a value that makes an instantaneous value of a point representing the symbol including the redundant bit in the base band signal always converge to a maximum value or a minimum value among four values to which the instantaneous value can converge.

15. A program for causing a computer to execute

the steps of:

generating a base band signal by converting data consisting of bit strings, in which at least a part of the bit strings is distinguished as a protection
5   object portion, into a base band signal representing a sequence of symbols of multiple values; and

judging whether a communication quality of an external transmission path for transmitting the base band signal has reached a predetermined standard,
10   in the base band signal generating step, processing is performed for, in a state in which it is judged that the communication quality of the transmission path has not reached the standard, converting the data into the base band signal such
15   that at least a part of the symbols belonging to the sequence of the symbols includes a bit belonging to the protection object portion and a predetermined redundant bit and, in a state in which it is judged that the communication quality of the transmission
20   path has reached the standard, converting the data into the base band signal such that at least a part of the symbols belonging to the sequence of the symbols includes a bit belonging to the protection object portion and additional data converted into the base
25   band signal together with the data, and

a value of the redundant bit is set to a value that makes a minimum value of a difference between instantaneous values of two points representing two symbols including the redundant bit and having values different from each other in the base band signal
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larger than a minimum value of a difference between instantaneous values of two points representing two symbols not including the redundant bit and different from each other.

16. A program for causing a computer to execute the steps of:

generating a base band signal by converting data consisting of bit strings, in which at least a part of the bit strings is distinguished as a protection object portion, into a base band signal representing a sequence of symbols of multiple values; and

judging a communication quality of an external transmission path for transmitting the base band signal,

wherein at least a part of the symbols belonging to the sequence of symbols includes a bit belonging to the protection object portion and a predetermined redundant bit or additional data converted into the base band signal together with the data,

in the base band signal generating step, processing is performed for converting the data into the base band signal such that a larger number of symbols include the additional data as a communication quality of the transmission path is higher, and

a value of the redundant bit is set to a value that makes a minimum value of a difference between instantaneous values of two points representing two symbols including the redundant bit and having values different from each other in the base band signal

larger than a minimum value of a difference between instantaneous values of two points representing two symbols not including the redundant bit and different from each other.